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REAL TIME: COMPUTERS, CHANGE AND SCHOOLING

A NATIONAL SAMPLE STUDY OF THE INFORMATION TECHNOLOGY SKILLS OF AUSTRALIAN SCHOOL STUDENTS

This article reports on a study of the information technology skills of Australian school students, commissioned by the Department of Education, Training and Youth Affairs on behalf of the Ministerial Council on Education, Employment, Training and Youth Affairs as a sample study for the 1997 National Report on Schooling in Australia. The article has been contributed by Denise Meredyth, Neil Russell, Leda Blackwood, Julian Thomas and Patricia Wise, of the Australian Key Centre for Cultural and Media Policy, Griffith University.

INTRODUCTION

The **Real Time: Computers, Change and Schooling** report¹ presents the results of a 1998 survey of a representative sample of primary and secondary schools throughout Australia. The sample was constructed to provide data on issues relating to the use of computers in schools by State and Territory, and by the three major education sectors - government, Catholic and independent. Survey forms were returned by 220 school principals, 1,258 teachers, and 6,213 students in the final year of primary school and the final year of junior secondary school. Data on information technology policy were obtained from every major school system in Australia and from a number of smaller, independent authorities. The emphasis in the study was on determining which information technology (IT) skills students and teachers were using in the classroom, and not on the administrative uses of computers in the school. This article presents the findings of the study which relate to the IT skills of students.

Information technology in the school

Most schools principals regard IT as a strong point of the school and as important to students' learning. The great majority of schools give a high budget priority to the provision of hardware and software for students and for teachers. However, principals and teachers report that funding presents one of the main barriers to developing students' IT skills.

Overall, the findings indicate that there has been a strong focus on providing computers for student use in schools. The results are reflected in the overall ratio of students to computers in the schools. Some 71% of schools surveyed reported that they had a student - computer ratio of 15 or fewer students to one computer, with 40% having ten or fewer students per computer. Using the student - computer ratio alone, clear disparities emerge between smaller and larger schools. Schools with low student - computer ratios are likely to be Independent schools, or combined or secondary schools, to be in high income areas and to be urban. Catholic schools are much more likely to have higher student-computer ratios.

Where student-computer ratios are advantageous, students are more confident about their own basic and advanced skills, and are more likely to say they enjoy using computers at school. The

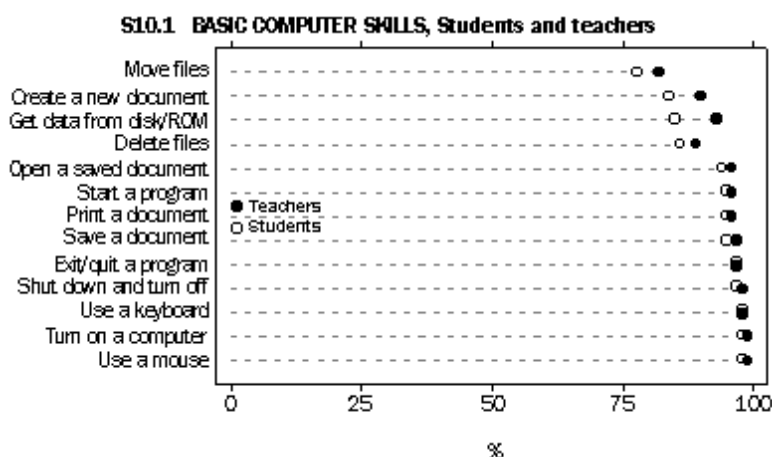
better the student-computer ratio, the more time students spend on computers at school, both alone and in small groups, and the wider and more sophisticated their use of IT across the curriculum.

However, the **Real Time** study cautioned against an overemphasis on the amount of equipment within schools, as measured by student-computer ratios. It is equally important that schools have a coherent and comprehensive IT policy covering current use and future directions.

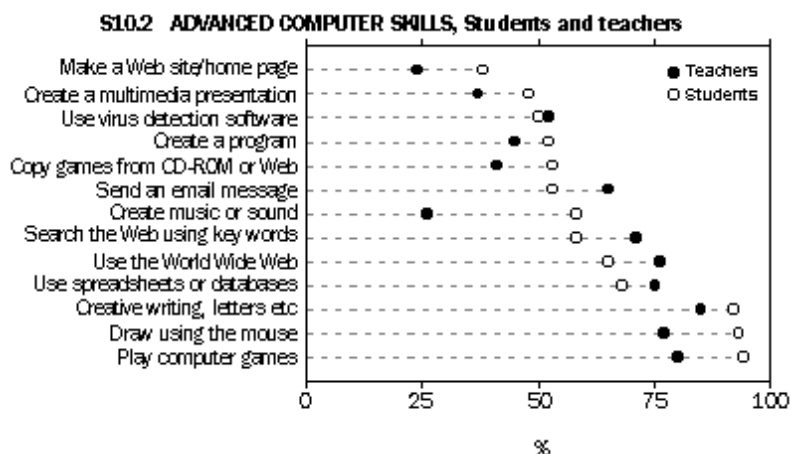
Information technology skills

Students were asked where they first acquired a range of 'core' and 'advanced' IT skills, and distinctions were made between the learning activities occurring in the school and outside it.

The profile for students' computer skills indicates an extremely high level of basic skills and a very high level of advanced skills. Over 95% of students surveyed have more than half of the skills core to the basic operation of computers, and nearly 80% have close to all of them (graph S10.1). The basic skills were defined as the ability to use a mouse, turn on a computer, shut down and turn off, exit or quit a program, save a document, print a document, start a program, open a saved document, delete files, get data from disk/CD-ROM, and create a new document. The majority of students with these basic skills developed them at home.



Some 50% or more of students have 11 of the 13 advanced skills (graph S10.2). These were defined as the ability to play computer games, draw using the mouse, use computers for creative writing, use spreadsheets or databases, use the World Wide Web, search the Web using keywords, create music or sound using a computer, send an email message, copy games from a CD-ROM or the Web, create a program, use virus detection software, create a multimedia presentation, and make a Web site or home page. Some 65% of students reported that they knew how to use the Web. Again, students reported that they tend to acquire these advanced skills at home rather than at school.



While the basic IT skills of students and their teachers are broadly equivalent, students are far ahead in advanced skills, especially in multimedia creation, creating music and sound, and creating Web sites or home pages. Teachers lead in the advanced skills which most students are more likely to learn at school - using and searching the Web, and sending email.

Some of the more remarkable findings relate to age. Some 56% of all students and 75% of current primary students began using computers before Year 4. This is consistent across school sectors and genders. The younger the students, the more likely they are to have started using computers earlier. Table S10.3 summarises the findings regarding the advanced computer skills of end primary and end secondary students, and where they acquired the skills (at home or at school).

S10.3 END PRIMARY AND END SECONDARY STUDENTS, Advanced Computer Skills by Where Acquired(a)(b)

Core skill	Have skill		Learnt at home		Learnt at school	
	End primary	End junior secondary	End primary	End junior secondary	End primary	End junior secondary
	%	%	%	%	%	%
Make a web site/home page	33	44	16	18	12	20
Create multimedia presentation	44	54	25	25	14	25
Use virus detection software	45	58	3	4	9	13
Create a program e.g. in logo, Pascal	45	62	24	23	17	38
Copy games from CD-ROM or Web	50	58	3	34	9	11

Send an email message	49	59	22	30	18	20
Create music or sound using computer	30	25	37	34	16	19
Search the Web using key words	51	68	20	27	19	30
Use the World Wide Web	59	75	23	28	24	35
Use spreadsheets or databases	57	84	28	29	26	53
Creative writing, letters etc	93	93	53	59	40	32
Draw using the mouse	93	94	61	63	29	29
Play computer games	96	95	70	75	22	15

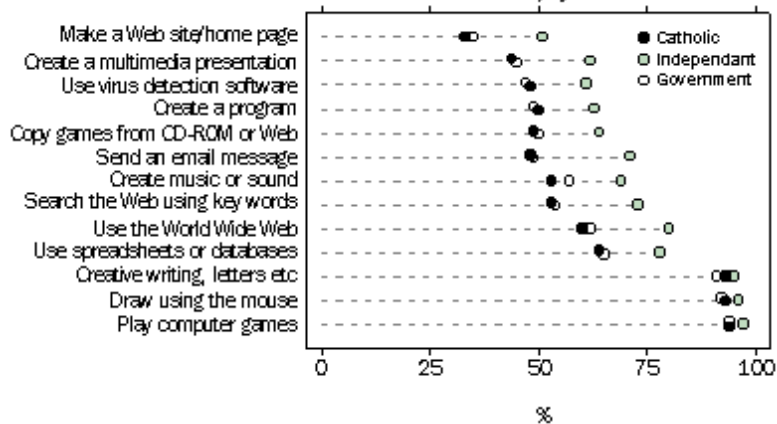
(a) More than one core skill could be reported in the survey response.

(b) An 'Other' column has not been included; columns 3-6 refer only to those reporting a skill(s).

Of those using computers outside school, 26% began before the age of 7, and 51% between the ages of 7 and 10. Furthermore, students at the end of primary school appear to use computers outside school more than those at the end of junior secondary school, and report higher levels of enjoyment. They are currently exploring advanced applications to almost the same extent as older students, especially when they have access to those applications at home. These findings appear to confirm the assertion in the literature that we are seeing a rapid acceleration of more use and more sophisticated use at an early age. However, the existence and nature of these trends needs to be confirmed by longitudinal study.

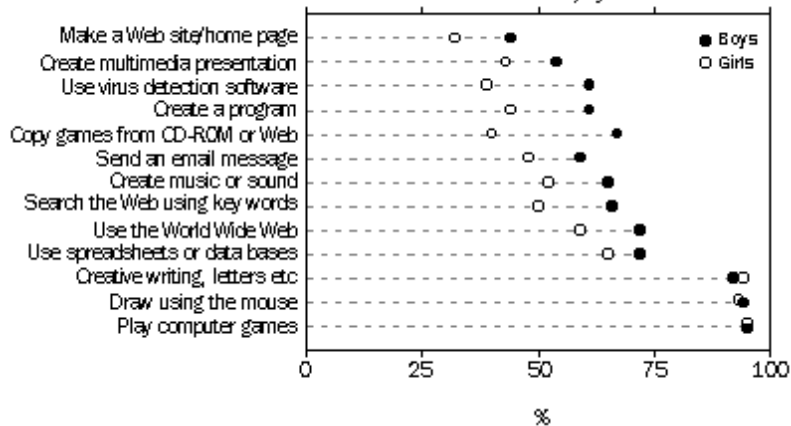
The study demonstrated disparities in students' IT skills, according to school type, size, sector, location and income area, and according to students' sex, cultural background and ethnicity. Indigenous students and students from small schools, especially in rural and isolated areas, are the most likely to lack basic skills. In the advanced skill range, students from Independent schools and single-sex boys' schools reported the greatest degree of familiarity with the most complex uses of IT, and those in primary schools, small schools and schools in rural, isolated and low-income areas reported the least. Graph S10.4 illustrates some of these differences at a broad level.

S10.4 STUDENTS ADVANCED COMPUTER SKILLS, By School Sector



Use of the Web is strongly related to income area, with 79% of students in schools within the highest income areas using it, as compared to 61% from the lowest. Boys have more advanced skills than girls (graph S10.5), although their basic skills are on a par.

S10.5 CHILDRENS ADVANCED COMPUTER SKILLS, By Gender

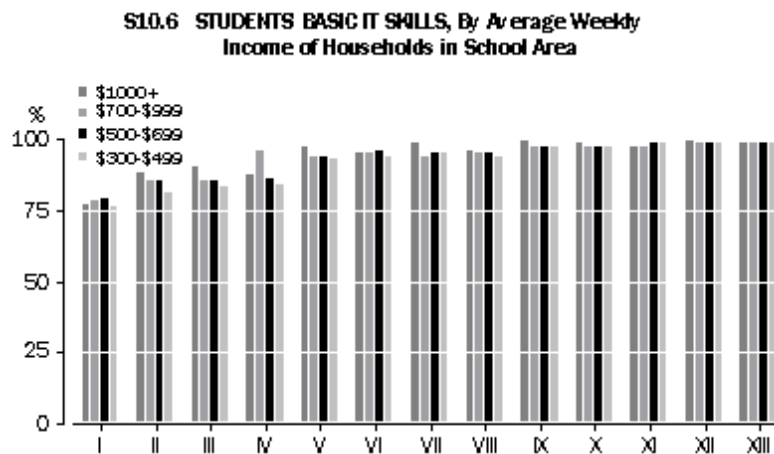


These findings are strongly related to family background and home use of computers. The study showed high levels of computer use outside school (85% of all students). Some 50% of students use a computer outside school every day or almost every day. The earlier they began using them, the more frequently they use them at a later age. Although a substantial minority of students developed their advanced skills at school, most acquired them at home. Indeed, a major finding of this study is that school is an unlikely venue for students to first acquire advanced IT skills. The exceptions - those least likely to use a computer outside school - are students in government schools and schools in lower income areas, country towns and small rural communities, and Indigenous students.

Patterns of home use appear to have very significant effects on students' skills, confidence and enjoyment in using IT. Students who first learned to use a computer outside school are more likely to enjoy using them outside school, and dislike using them at school. They are far more likely to judge their ability to use computers at schools as excellent, than students who first developed skills at school, while those who learned the skills at school are likely to be less confident about their own abilities.

School location, sector and socio-economic background² are closely linked to the presence of computers and computer-related technologies in students' homes, to patterns of use and to the age when students first use computers, both at school and elsewhere. The higher the average family income of the area where students go to school and the greater the population density, the more likely students are to have acquired IT skills at home, to use them more frequently and to

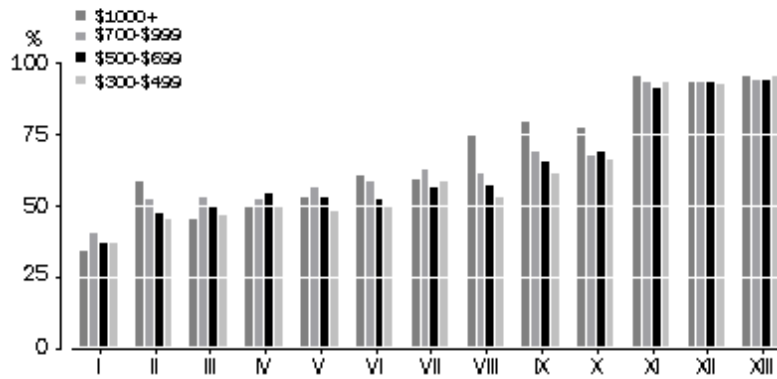
have started earlier than others. Students from Independent schools, and schools in urban areas and high income areas are most likely to use computers outside school, most likely to use them frequently and most likely to enjoy using them. They are most likely to have computers in the home and to own their own computer, and they are also more likely to have access to a range of other technologies and resources in the home, including modem, fax, printer and scanner, their own room and their own computer. Graph S10.6 illustrates, for students' basic IT skills, the relationship between those skills and household income. Graph S10.7 illustrates that relationship for students' advanced IT skills.



Key to basic computer skills

I	Move files.
II	Create a new document.
III	Get data from disk/CD ROM.
IV	Delete files.
V	Open a saved document.
VI	Start a program.
VII	Print a document.
VIII	Save a document.
IX	Exit/quit a program.
X	Shut down and turn off.
XI	Use a keyboard.
XII	Turn on a computer.
XIII	Use a mouse.

S10.7 STUDENTS ADVANCED SKILLS, By Average Weekly Income of Households in School Area



Key to advanced computer skills

I	Make a web site/home page.
II	Create multimedia presentation.
III	Use virus detection software.
IV	Create a program e.g. in logo, Pascal.
V	Copy games from CD-ROM or Web.
VI	Send an email message.
VII	Create music or sound using computer.
VIII	Search the Web using key words.
IX	Use the World Wide Web.
X	Use spreadsheets or databases.
XI	Creative writing, letters etc.
XII	Draw using the mouse.
XIII	Play computer games.

Boys are also more likely to have learned basic skills at home than girls, whereas girls tend to acquire their skills at school. Indigenous students are also more likely to learn these skills at school than at home, though many acquire them at other sites outside school.

The pattern of IT use by gender is equally complex. The difference appears in patterns of home use. Boys start using computers earlier outside school and are more likely to have access to computer-related technologies, games and their own computer, and supplement their school-based computer activities with extensive experimentation outside school. Girls are significantly less likely than boys to have their own computer. Boys report significantly higher use of video games, SEGA and Nintendo games, and communication uses, whereas girls outside school are more likely to use computers for study. This is possibly why girls report fewer IT skills, despite showing considerable interest and skill in other applications. Girls tend to acquire basic skills at

school, thus evening out the disparity, but many of the advanced skills are not taught at school, partly because teachers are often unfamiliar with more advanced applications. Where girls do not learn advanced computer skills at home, they tend not to acquire them at all. These patterns are consistent across income areas. Nevertheless, they are likely to be far more marked for girls in low income areas, government schools, small schools and rural areas than for those in Independent or single-sex schools. Indigenous girls are multiply disadvantaged.

These findings reinforce the warning in the literature that inequities in household access to computers and networks will widen the gap between the 'information rich' and the 'information poor'. Apart from income and equipment in the home, however, various factors may influence the use which children make of technology. These include the time parents put aside to explore the Web with their children, the extent to which children are encouraged to experiment, and a cultural context which encourages a move from entertainment uses to more sophisticated uses.

The findings reported in this study suggest that IT at school does at times compensate for social disparities and comparative advantage in IT access, for example where school use of computers appears to balance out the differences between boys' and girls' basic computer skills. In the range of advanced skills, however, schools do not appear to be effectively compensating for social difference. The reason may be the difference between the level of teachers' basic and advanced skills. It therefore seems clear that, if schools are to compensate for social and economic differences, and provide common competencies across the population, it is important to improve teachers' advanced IT skills.

Endnotes

- 1 **Real Time: Computers, Change and Schooling**, Commonwealth of Australia, Canberra 1999.
- 2 The matching of postcodes to the ABS socio-economic indices is in terms of the indices developed from CDATA91 (1991 Population Census data), the development of which is reported in the ABS Information Paper **1991 Census - Socio-Economic Indexes for Areas** (2912.0).

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